

REMARKS/ARGUMENTS

Claims 1-20 and 23-27 are pending, with claims 21-22 having previously been cancelled without prejudice. In the present Amendment, claim 20 is amended. No new matter is added.

Objection to the Specification

The Examiner objected to the Title. Applicants have amended the Title as suggested by the Examiner. Withdrawal of the objection is respectfully requested.

Claim Rejections

The Examiner rejected claims 1, 4, 6, 12-15, 19-20 and 24-27 under 35 U.S.C. §103 as being obvious over U.S. Patent No. 4,710,795 ("Nippert") in view of U.S. Patent No. 4,952,829 ("Armbruster"). Also, the Examiner rejected claims 3, 16 and 18 as being obvious over Nippert and Armbruster and further in view of International (PCT) Publication No. WO 01/27997 ("Wolf"). In addition, the Examiner rejected claim 2 as being obvious over Nippert and Armbruster and further in view of U.S. Patent No. 6,060,795 ("Azotea"). Further, the Examiner rejected claim 10 as being obvious over Nippert and Armbruster and further in view of Azotea and Wolf. Also, the Examiner rejected claim 5 as being obvious over Nippert and Armbruster and further in view of U.S. Patent No. 6,274,955 ("Sato"). In addition, the Examiner rejected claim 7 as being obvious over Nippert, Armbruster and Wolf and further in view of U.S. Patent No. 5,697,811 ("Pickles"). Further, the Examiner rejected claim 8 as being obvious over Nippert and Armbruster and further in view of U.S. Patent Publication No. 2003/0080772 ("Giacomini"). Also, the Examiner rejected claim 9 as being obvious over Nippert and Armbruster and further in view of U.S. Patent Publication No. 2003/0128080 ("Viswanathan"). In addition, the Examiner rejected claim 11 as being obvious over Nippert and Armbruster and further in view of U.S. Patent No. 6,440,750 ("Feygenson"). Finally, the Examiner rejected claim 17 as being obvious over Nippert and Armbruster and further in view of U.S. Patent No. 6,327,332 ("Weber"). Reconsideration of the rejections is respectfully requested.

Independent Claim 1

Independent claim 1 defines an electric motor (10) for adjusting moving parts in a motor vehicle, comprising an electronic unit (70) with a sandwich construction, which contains a first

electrically conductive substrate (71) and a second electric conductive substrate (72), between which power components (75) are located and electrically connected to both substrates (71, 72), and a side (84) of the second substrate (72) facing away from the first substrate (71) is equipped with additional electronic components (56), wherein the first substrate (71) is a punched grid (44) punched from a metal material, the punched grid (44) being directly electrically and mechanically connected to the power components (75), the punched grid (44) supporting the power components (75), the punched grid (44) together with the second substrate (72) is extrusion coated with and totally encapsulated by a plastic body (95) produced by injection molding in such a way that only extensions (97) of the punched grid (44) protrude from the plastic body (95), forming an electrical and/or mechanical interface (98) for connecting additional motor components (99, 38, 40, 104, 102, 80).

Nippert discloses a semi-conductor power module including ceramic substrates (base plate 2 and cover plate 3) which are metallized on both sides by direct bonding with copper or ceramic. The metallized surfaces are etched with the desired run structure. A plastic housing can be placed over the cover plate 3 and cemented to the non-metallized outer edge of the ceramic base plate 2. The housing may thereafter be filled with casting compound.

Nippert does not teach or suggest, among other things, an electric motor including an electronic unit containing a first substrate which is a punched grid punched from a metal material. Rather, Nippert discloses that the ceramic substrates (plates 2, 3) are metallized by direct bonding with copper and etched to provide the desired run structure. In Nippert, the metallized surfaces do not provide a substrate, as claimed, and do not support any power components. Instead, the ceramic plates 2, 3 support the power components.

Nippert also does not teach or suggest the plates 2, 3 being extrusion coated with and totally encapsulated by a plastic body produced by injection molding in such a way that only extensions of a punched grid protrude from the plastic body. Rather, Nippert discloses that a plastic housing (not shown) can be placed over the cover plate 3 and cemented to the outer edge of the ceramic base plate 2 and, thereafter, that the housing can be filled with casting compound. In such a construction, the ceramic base plate 2 of Nippert is not totally encapsulated by the casting compound. Rather, at least the metallized lower surface and side surfaces of the ceramic base plate 2 are not encapsulated by the casting compound but are completely uncovered.

For at least these independent reasons, Nippert does not teach or suggest the subject matter of claim 1.

Armbruster does not cure the deficiencies of Nippert. Armbruster discloses a rectifier arrangement including a positive heat sink 10 and a negative heat sink 12, serving as carrier plates for rectifier diodes, and a printed circuit board 11 arranged in a sandwich-type construction between the heat sinks 10 and 12. As shown in Figs. 2 and 7, the printed circuit board 11 includes a plate-shaped body of insulating plastic in which a punched grid 16 is embedded. To form the circuit board 11, the punched grid 16 is punched out of a suitable circular sheet metal blank (MS-plate), and plastic material is then injection molded to completely enclose the basic shape of the punched grid 16. Ends of the punched grid 16, for forming electrical connections, protrude from the plastic material. After injection molding, while held in place by the plastic material, the conductors of the punched grid 16 are cut up to provide the desired conductive paths.

Armbruster does not teach or suggest, among other things, an electric motor including an electronic unit containing a first substrate which is a punched grid punched from a metal material. Rather, Armbruster discloses heat sinks 10 and 12 which serve as carriers for rectifier diodes and between which a circuit board 11 is sandwiched. At most, Armbruster discloses that the circuit board 11 includes a punched grid 16. However, before this circuit board 11 is assembled with the heat sinks 10 and 12, the punched grid 16 is embedded in an injection molded plastic body. Also, Armbruster does not teach or suggest that the punched grid 16 supports any power components. In Armbruster, the heat sinks 10 and 12 provide support for the rectifier diodes. Support provided by the circuit board 11 acting as a substrate, if any, would only be provided by the plastic material of the body which also holds the conductors of the punched grid 16 in place.

In addition, Armbruster does not teach or suggest that the punched grid 16 together with a substrate (e.g., the heat sink 10 and/or the heat sink 12) is extrusion coated with and totally encapsulated by a plastic body produced by injection molding. Rather, in Armbruster, only the punched grid 16 is embedded in the injection molded plastic body of the circuit board 11 prior to and in a process separate from assembly with the heat sink 10 and/or 12.

For at least these independent reasons, Armbruster also does not teach or suggest the subject matter of claim 1.

Further, Applicants respectfully submit that, assuming *arguendo*, the circuit board 11 of Armbruster could be combined with the semi-conductor power module of Nippert (e.g., in place of one of the ceramic substrates (base plate 2 and cover plate 3), such a combination would still lack the above-described claim elements.

For example, such a combination lacks a first substrate which is a punched grid punched from a metal material, the punched grid supporting power components. In such a combination, the ceramic substrate(s) of Nippert or the plastic body of the circuit board 11 of Armbruster acts as a substrate and could provide support to any components. The punched grid 16 of Armbruster does not.

In addition, such a combination still lacks a punched grid together with a substrate being extrusion coated with and totally encapsulated by a plastic body produced by injection molding. Again, at least the lower surface and side surfaces of the base plate (e.g., the ceramic base plate 2 of Nippert or the circuit board 11 of Armbruster) would not be encapsulated by the casting compound.

Therefore, Nippert and Armbruster, alone or in combination, do not teach or suggest each and every limitation set forth in claim 1. Accordingly, independent claim 1 is allowable.

Dependent claims 2-19 and 23-27 depend from independent claim 1 and are allowable for at least the same and other independent reasons. In addition, the additional subject matter defined by the dependent claims, for example, by dependent claims 26-27, provide separate bases for allowance.

Dependent claim 26 specifies that plastic molding compound of the plastic body totally encapsulates the punched grid, the second substrate, the power components, and the electronic components. Again, in Nippert, at least the outer side of the base plate 2 is not covered by any casting compound. In Armbruster, only the punched grid 16 is encapsulated; the heat sinks 10 and 12 are not.

The Examiner contends that the claimed subject matter is an obvious rearrangement of the molding compound. Applicants respectfully disagree. In Nippert, casting compound only fills the plastic housing connected to the upper surface of the ceramic base plate 2. Covering the lower surface and the side surfaces of the ceramic base plate 2 of Nippert would require radical modification of the assembly and operation of the semiconductor power module of Nippert (e.g., additional components/housings, additional injection molding processes, etc.).

In Armbruster, only the punched grid 16 is embedded in the injection molded plastic body of the circuit board 11 prior to and in a process separate from assembly with the heat sink 10 and/or 12. Similarly, covering the heat sink(s) 10 and/or 12 of Armbruster would require radical modification of the assembly and operation of the rectifier arrangement of Armbruster (e.g., additional injection molding processes, additional heat sink(s), etc.).

For at least these reasons, Applicants respectfully submit that the cited prior art does not teach or suggest the additional subject matter defined by dependent claim 26 and that the claimed subject matter is not simply an obvious rearrangement of parts. Accordingly, claim 26 defines additional patentable subject matter.

Dependent claim 27 specifies that, before encapsulation, the side of the second substrate provides an outer surface and a side of the punched grid facing away from the second substrate provides an opposite outer surface, and that plastic molding compound of the plastic body covers the side of the second substrate and the side of the punched grid facing away from the second substrate. In Nippert, the outer side of the base plate 2 is not covered by any casting compound. In Armbruster, the heat sinks 10 and 12 provide outer surfaces of the rectifier arrangement, and the heat sinks 10 and 12 are not covered by or encapsulated in plastic molding compound.

The Examiner contends that the claimed subject matter is an obvious rearrangement of the molding compound. Applicants respectfully disagree. In Nippert, casting compound only fills the plastic housing connected to the upper surface of the ceramic base plate 2. Covering the lower outer surface and the side surfaces of the ceramic base plate 2 of Nippert would require radical modification of the assembly and operation of the semiconductor power module of Nippert (e.g., additional components/housings, additional injection molding processes, etc.).

In Armbruster, only the punched grid 16 is embedded in the injection molded plastic body of the circuit board 11 prior to and in a process separate from assembly with the heat sink 10 and/or 12. Similarly, covering the heat sink(s) 10 and/or 12 of Armbruster would require radical modification of the assembly and operation of the rectifier arrangement of Armbruster (e.g., additional injection molding processes, additional heat sink(s), etc.).

For at least these reasons, Applicants respectfully submit that the cited prior art does not teach or suggest the additional subject matter defined by dependent claim 27 and that the claimed subject matter is not simply an obvious rearrangement of parts. Accordingly, claim 27 defines additional patentable subject matter.

Independent Claim 20

Amended independent claim 20 defines an electronic module (70) in a sandwich construction, comprising a first electrically conductive substrate (71) and a second electrically conductive substrate (72), between which power components (75) are located and electrically connected to both substrates (71, 72), and a side (84) of the second substrate (72) facing away from the first substrate (71) is equipped with additional electronic components (56), wherein the first substrate (71) is a punched grid (44) punched from a metal material, the punched grid (44) being directly electrically and mechanically connected to the power components (75), the punched grid (44) supporting the power components (75), the punched grid (44) together with the second substrate (72) is extrusion coated with and totally encapsulated by a plastic body (95) produced by injection molding, in such a way that only extensions (97) of the punched grid (44) protrude from the plastic body (95), forming an electrical and/or mechanical interface (98) for connecting additional motor components (99, 38, 40, 104, 102, 80), wherein plastic molding compound of the plastic body (95) is arranged in gaps (113) and voids (113) between the substrates (71, 72) and the power components (75).

As discussed above with respect to claim 1, Nippert does not teach or suggest, among other things, an electronic module including a first substrate which is a punched grid punched from a metal material. Rather, Nippert discloses that the ceramic substrates (plates 2, 3) are metallized by direct bonding with copper and etched to provide the desired run structure. In Nippert, the metallized surfaces do not provide a substrate, as claimed, and do not support any power components. Instead, the ceramic plates 2, 3 support the power components.

Nippert also does not teach or suggest the plates 2, 3 being extrusion coated with and totally encapsulated by a plastic body produced by injection molding in such a way that only extensions of a punched grid protrude from the plastic body. Rather, Nippert discloses that a plastic housing (not shown) can be placed over the cover plate 3 and cemented to the outer edge of the ceramic base plate 2 and, thereafter, that the housing can be filled with casting compound. In such a construction, the ceramic base plate 2 of Nippert is not totally encapsulated by the casting compound. Rather, at least the metallized lower surface and side surfaces of the ceramic base plate 2 are not encapsulated by the casting compound but are completely uncovered.

For at least these independent reasons, Nippert does not teach or suggest the subject matter of claim 20.

Armbruster does not cure the deficiencies of Nippert. As also discussed above with respect to claim 1, Armbruster does not teach or suggest, among other things, an electronic module including a first substrate which is a punched grid punched from a metal material. Rather, Armbruster discloses heat sinks 10 and 12 which serve as carriers for rectifier diodes and between which a circuit board 11 is sandwiched. At most, Armbruster discloses that the circuit board 11 includes a punched grid 16. However, before this circuit board 11 is assembled with the heat sinks 10 and 12, the punched grid 16 is embedded in an injection molded plastic body. Also, Armbruster does not teach or suggest that the punched grid 16 supports any power components. In Armbruster, the heat sinks 10 and 12 provide support for the rectifier diodes. Support provided by the circuit board 11 acting as a substrate, if any, would only be provided by the plastic material of the body which also holds the conductors of the punched grid 16 in place.

In addition, Armbruster does not teach or suggest that the punched grid 16 together with a substrate (e.g., the heat sink 10 and/or the heat sink 12) is extrusion coated with and totally encapsulated by a plastic body produced by injection molding. Rather, in Armbruster, only the punched grid 16 is embedded in the injection molded plastic body of the circuit board 11 prior to and in a process separate from assembly with the heat sink 10 and/or 12.

For at least these independent reasons, Armbruster also does not teach or suggest the subject matter of claim 20.

Further, Applicants respectfully submit that, assuming *arguendo*, the circuit board 11 of Armbruster could be combined with the semi-conductor power module of Nippert (e.g., in place of one of the ceramic substrates (base plate 2 and cover plate 3), such a combination would still lack the above-described claim elements. Rather than re-present the arguments set forth above with respect to this contention, for brevity's sake, Applicants refer to the discussion above for claim 1. With respect to claim 20, the same arguments apply.

Therefore, Nippert and Armbruster, alone or in combination, do not teach or suggest each and every limitation set forth in claim 20. Accordingly, independent claim 20 is allowable.

CONCLUSION

In view of the foregoing, Applicants respectfully request entry of the present Amendment and allowance of claims 1-20 and 23-27.

If additional consultation will further prosecution, the undersigned is available during normal business hours at the below-identified telephone number.

Respectfully submitted,

/Edward R. Lawson Jr./

Edward R. Lawson Jr.
Reg. No. 41,931

Docket No. 022862-1102-00
Michael Best & Friedrich LLP
100 East Wisconsin Avenue
Suite 3300
Milwaukee, Wisconsin 53202-4108
414.271.6560